TC 31-29/A Special Forces Caching Techniques

U.S. ARMY SPECIAL FORCES

CACHING TECHNIQUES

U.S. ARMY
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CACHING

Caching is the process of hiding equipment or materials in a secure storage place with the view to future recovery for operational use. The ultimate success of caching may well depend upon attention to detail, that is, professional competence that may seem of minor importance to the untrained eye. Security factors, such as cover for the caching party, sterility of the items cached, and removal of even the slightest trace of the caching operations are vital. Highly important, too, are the technical factors that govern the preservation of the items in usable condition and the recording of data essential for recovery. Successful caching entails careful adherence to the basic principles of clandestine operations, as well as familiarity with the technicalities of caching.

Section 1
Caching Considerations

Caching considerations that are vital to the success of the caching operation may be done in a variety of operational situations. For example, cached supplies can meet the emergency needs of personnel who may be barred from their normal supply sources by sudden developments or who may need travel documents and extra funds for quick escape. Caching can help solve the supply problems of long-term operations conducted far from a secure base.

Caching also can provide for anticipated needs of wartime operations in areas likely to be overrun by the enemy.

PLANNING FOR A CACHING OPERATION

Caching involves selecting items to be cached, procuring those items, and selecting a cache site. Selection of the items to be cached requires a close estimate of what will be needed by particular units for particular operations. Procurement of the items usually presents no special problems. In fact, the relative ease of procurement before an emergency arises is one of the prime considerations in favour of caching. When selecting a cache site, planners should always ensure that the site is accessible not only for emplacement, but also for recovery. When planning a caching operation, the planner must consider seven basic factors.

1 Purpose and Contents of the Cache

Planners must determine the purpose and contents of each cache because theses basic factors influence the location of the cache, as well as the method of hiding. For instance, small barter items can be cached at any accessible and secure site because they can be concealed easily on the person once recovered. However, it would be difficult to conceal rifles for a Guerrilla Band once recovered. Therefore, this site must be in an isolated area where the band can establish at least temporary control. Certain items, such as medical stock, have limited shelf life and require rotation periodically or special storage considerations, necessitating easy access to service these items. Sometimes it is impossible to locate a cache in the most convenient place for an intended user. Planners must compromise between logistical objectives and actual possibilities when selecting a cache site. Security is always the overriding consideration.

2 Anticipated Enemy Action

In planning the caching operation, planners must consider the capabilities of any intelligence or security services not participating in the operation. They should also consider the potential hazards the enemy and its witting or unwitting accomplices present. If caching is done for wartime operational purposes, its ultimate success will depend largely on whether the planners anticipate the various obstacles to recovery, which the enemy and its accomplices will create if the enemy occupies the area. What are the possibilities that the enemy will pre-empt an ideal site for one reason or another and deny access to it? A vacant field surrounded by brush may seem ideal for a particular cache because it is near several highways. But such a location may also invite the enemy to locate an ordnance depot where the cache is buried.

3 Activities of the local Population

Probably more dangerous than deliberate enemy action are all of the chance circumstances that may result in the discovery of the cache. Normal activity, such as construction of a new building, may uncover the cache site or impede access to it. Bad luck cannot be anticipated, but it can probably be avoided by careful and imaginative observation of the prospective cache site and of the people who live near the site. If the cache is intended for wartime use, the planners must project how the residents will react to the pressures of war and conquest. For example, one of the more likely reactions is that many residents may resort to caching to avoid having their personal funds and valuables seized by the enemy. If caching becomes popular, any likely cache site will receive more than normal attention.

4 Intended Actions by Allied Forces

Using one cache site for several clandestine operations involves a risk of mutual compromise. Therefore, some planners should rule out otherwise suitable caching sites if they have been selected for other clandestine purposes, such as drops or safe houses. A site should not be located where it may be destroyed or rendered inaccessible by bombing or

other allied military action, should the area be occupied by the enemy. For example, installations likely to be objects of special protective efforts by the occupying enemy are certain to be inaccessible to the ordinary citizen. Therefore, if the cache is intended for wartime use, the caching party should avoid areas such as those near key bridges, railroad intersections, power plants, and munitions factories.

5 Packaging and Transportation Assets

Planners should assess the security needs and all of the potential obstacles and hazards that a prospective cache site can present. They should also consider whether the operational assets that could be used for packaging and transporting the package to the site. Best results are obtained when the packaging is done by experts at a packaging center. The first question, therefore, is to decide whether the package can be transported from the headquarters or the field packaging centre to the cache site securely and soon enough to meet the operational schedules. If not, the packaging must be done locally, perhaps in a safe house located within a few miles of the cache site. If such an arrangement is necessary, the choice of cache sites may be restricted by limited safe house possibilities.

6 Personal Assets

All who participate directly in emplacement will know where the cache is located. Therefore, only the fewest possible and the most reliable persons should be used. Planners must consider the distance from the person's residence to the prospective cache site and what action cover is required for the trip. Sometimes transportations and cover difficulties require the cache site to be within a limited distance of the person's residence. The above considerations also apply to the recovery personnel.

7 Caching Methods

Which cache method to use depends on the situation. It is therefore unsound to lay down any general rules, with one exception. Planners should always think in terms of suitability, for example, the method most suitable for each cache, considering its specific purpose; the actual situation in the particular locality; and the changes that may occur if the enemy gains control.

Concealment.
Concealment requires the use of permanent man-made or natural features to hide or disguises the cache. It has several advantages. Both employment and recovery usually and be done with minimum time and labour, and cached items concealed inside a building or dry cave are protected from the elements. Thus, they require less elaborate packaging. Also, in some cases, a concealed cache can be readily inspected from time to time to ensure that it is still usable. However, there is always the chance of accidental discovery in addition to all the hazards of wartime that may result in discovery or destruction or a concealed cache or denial of access to the site. The concealment method, therefore, is most suitable in cases where an exceptionally secure site is available or where a need for quick access to the cache justifies a calculated sacrifice in security.

Concealment may range from securing small gold coins under a tile in the floor to walling up artillery in caves.

Burial. Adequate burial sites can be found almost anywhere. Once in place, a properly buried cache is generally the best way of achieving lasting security. In contrast to concealment, however, burial in the ground is a laborious and time-consuming method of caching.

The disadvantages of burial are that

- Burial almost always requires a high-quality container or special wrapping to protect the Cache from moisture, chemicals and bacteria in the soil.
- Emplacement or recovery of a buried cache usually takes so long that the operation must be done after dark unless the site is exceptionally secluded.
- It is especially difficult to identify and locate a buried cache.

Submersion.

Submersion sites that are suitable for secure concealment of a submerged cache are few and far between. Also, the container of a submerged cache must meet such high standards for waterproofing and resistance to external pressure that the use of field expedients is seldom workable. To ensure that a submerged cache remains dry and in place, planners must determine not only the depth of the water, but the type of bottom, the currents, and other facts that are relatively difficult for nonspecialists to obtain. Emplacement, likewise requires a high degree of skill. At least two persons are needed for both emplacement and requires additional equipment. In view of the difficulties - especially the difficulty of recovery - the submersion method is suitable only on rare occasions. The most noteworthy usage is the relatively rare maritime re-supply operation where it is impossible to deliver supplies directly to a reception committee. Caching supplies offshore by submersion is often preferable to sending a landing party ashore to bury a cache.

SELECTION OF THE SITE

The most careful estimates of future operational conditions cannot ensure that a will cache will be accessible when it is needed. However, criteria for a site selection can be met when three questions are answered.

Criteria for Site Selection

Can the site be located by simple instructions that are unmistakably clear to someone who has never visited the location? A site may be ideal in every respect, but if it has no distinct, permanent landmarks within a readily measurable distance it must be ruled out. Are there at least two secure routes to and from the site? Both primary and alternate routes should provide natural concealment so that the emplacement party and the recovery party can visit the site without being seen by anyone normally in the vicinity. An alienate escape route offers hope of avoiding detection and recovered at the chosen site in all seasons? Snow and frozen ground create special problems. Snow on the ground is a hazard because it is

impossible to erase a trail in the snow. Planners must consider whether seasonal changes in the foliage will leave the site and the dangerously exposed.

The Map Survey

Finding a cache site is often difficult. Usually, a thorough systematic survey of the general area designated for the cache is required. The survey is best done with as large-scale map of the area as is available. By scrutinizing the map, the planners can determine whether a particular sector must be ruled out because of its nearness to factories, homes, busy thoroughfares, or probable military targets in wartime. A good military-type map will show the positive features in the topography; proximity to adequate roads or trails, natural concealment (for example: surrounding woods or groves), and adequate drainage. A map also will show the natural and man-made features in the landscape. It will provide the indispensable reference points for locating a cache site: confluences of streams, dams and waterfalls, road junctures and distance markers, villages, bridges, churches, and cemeteries.

The Personal Reconnaissance

A map survey normally should show the location of several promising sites within the general area designated for the cache. To select and pinpoint the best site, however, a well-qualified observer must examine each site firsthand. If possible, whoever examines the site should carry adequate maps, a compass, a drawing pad or board for making sketch maps or tracings, and a metallic measuring line. (A wire knotted at regular intervals is adequate for measuring. Twine or cloth measuring tapes should not be used because stretching or shrinking will make them inaccurate if they get wet.) The observer should also carry a probe rod for probing prospective burial sites, if the rod can be carried securely.
Since the observer seldom completes a field survey without being noticed by local residents, his action cover is of great importance. His cover must offer a natural explanation for his exploratory activity in the area. Ordinarily, this means that an observer who is not a known resident of the area can pose as a tourist or a newcomer with some reason for visiting the area. However, his action cover must be developed over an extended period before he undertakes the actual reconnaissance. If the observer is a known resident of the area, he cannot suddenly take up hunting, fishing, or wildlife photography without arousing interest and perhaps suspicion. But he must build up a reputation for being a devotee of his sport or hobby.

Reference Points

When the observer finds a suitable cache site, he prepares simple and unmistakable instructions for locating the reference points. These instructions must identify the general area (the names of general recognizable places, from the country down to the nearest village) and an immediate reference point. Any durable landmark that is identified by its title or simple description can be immediate reference point (for example, the only Roman Catholic church in a certain village or the only bridge on a named road between two villages). The instructions must also include a final reference point (FRP), which must meet four requirements:

(1) It must be identifiable, including at least one feature that can be used as a precise reference point.
(2) It must be an object that will remain fixed as long as the cache may be used.
(3) It must be near enough to the cache to pinpoint the exact location of the cache by precise linear measurements from the FRP to the cache
(4) It should be related to the immediate reference point by a simple route description, which proceeds from the immediate reference point to the FRP

Since the route description should be reduced to the minimum essential, the ideal solution for locating the cache is to combine the immediate reference point and the FRP into one landmark readily identifiable, but sufficiently secluded. The following objects, when available, are sometimes ideal reference points: small, unfrequented bridges, and dams, boundary markers, kilometre markers and culverts along unfrequented roads, a geodetic survey marker, battle monuments, and wayside shrines. When such reference points are not available at an otherwise suitable cache site, natural or man-made objects may serve as FRP's: distinct rocks, posts for power or telephone lines, intersections in stone fences or hedgerows, and gravestones in isolated cemeteries.

Pinpointing Techniques

Recovery instructions must identify the exact location of the cache. These instructions must describe the point where the cache is placed in terms that relate in to the FRP. When the concealment method is used, the cache ordinarily is placed inside the FRP, so it is pinpointed by a precise description of the FRP. A submerged cache usually is pinpointed by describing exactly how the moorings are attached to the FRP. With a buried cache, any of the following techniques may be used.

Placing the cache directly beside the FRP. The simplest method is to place the cache directly beside the FRP. Then pinpointing is reduced to specifying the precise reference point of the FRP.

Sighting the cache by projection, this method may be used if the FRP has one flat side long enough to permit precise sighting by projecting a line along the side of the object. The burial party places the cache a measured distance along the sighted line. This method may also be used if two precise FRP's are available, by projecting a line sighed between the two objects. In either case, the instructions for finding the cache must state the approximate direction of the cache from the FRP. Since small errors in sighting are magnified as the sighted line is extended, the cache should be placed as close to the FRP as other factors permit. Ordinarily this method becomes unreliable if the sighted line is extended beyond 50 meters.

Placing the cache at the intersection of measured lines. If two FRP's are available within several paces, the cache can be one line projected from each of the FRP's. If this method is used, state the approximate direction of the cache from each FRP. To ensure accuracy, neither of the projected lines (from the FRP's to the point of emplacement) should be more

than twice as long as the base line (between the two FRP's). If this proportion is maintained, the only limitation upon the length of the projected lines is the length of the measuring line that the recovery party is expected to carry. The recovery party should carry two measuring lines when this method is used.

Sighting the cache by compass azimuth. If the above methods of sighting are not feasible, one measured line may be projected by taking a compass azimuth from the FRP to the point where the cache is placed. To avoid confusion, use an azimuth to a cardinal point of the compass (north, east, south, or west). Since compass sightings are likely to be inaccurate, a cache that is pinpointed by this method should not be placed more than 10 meters from the FRP.

Measuring Distances

The observer should express all measured distances in a linear system that the recovery party is sure to understand - ordinarily the standard system for the country where the cache is located. He should use whole numbers (6 meters, not 6.3 or 6.5, etc.) to keep his instructions as brief and as simple as possible. To get an exact location for the cache in whole numbers, take sightings and measurements first.
If the surface of the ground between the points to be measured is uneven, the linear distance should be measured on a direct line from point to point, rather than by following the contour of the ground. This method requires a measuring line long enough to reach the full distance from point to point and enough to be pulled taut without breaking.

Marking Techniques

The emplacement operation can be simplified and critical time saved if the point where the cache is to be buried is marked during the reconnaissance.

If a night burial is planned, the point of emplacement may have to be marked during a daylight reconnaissance. This method should be used whenever operational conditions permit. The marker must be an object that is easily recognizable but that is meaningless to an unwitting observer. For example, a small rock or a branch with its butt placed at the point selected for the emplacement may be used.
During a personal reconnaissance, the observer must not only pinpoint the cache site, but also gather all the incidental information required for planning the emplacement operation. It is especially important to determine the best route to the site and at least one alternate route, the security hazards along these routes, and any information that can be used to overcome the hazards.
Since this information is also essential to the recovery operation, it must be compiled after emplacement and included in the final cache report. Therefore, the observer should be thoroughly familiar with the Twelve-Point Cache Report before he starts a personal reconnaissance. This report is a checklist for the observer to record as much information as possible. Points 6 through 11 are particularly important. The personal reconnaissance also provides an excellent opportunity for a preliminary estimate of the time required for getting to the site.

The Alternate Site

As a general rule, planners should select an alternate site in case unforeseen difficulties prevent use of the best site. Unless the primary site is in a completely deserted area, there is always some danger that the emplacement party will find it occupied as they approach, or that the party will be observed as they near the site. The alternate site should be far enough away to be screened from view from the primary site, but near enough so that the party can reach it without making a second trip.

The Concealment Site

A site that looks ideal for concealment may be revealed to the enemy for that very reason. Such a site may be equally attractive to a native of an occupied country to hide his valuables. The only real key to the ideal concealment site is careful casing of the area combined with great familiarity with local residents and their customs. The following is a list of likely concealment sites:

- Natural caves and caverns, and abandoned mines and quarries.
- Walls (hidden behind loose bricks or stones or hidden a plastered surface).
- Abandoned buildings.
- Infrequently used structures (stadiums and other recreational facilities, and railroad facilities on spur lines).
- Memorial edifices (mausoleums, crypts, monuments).
- Public buildings (museums, churches, libraries).
- Ruins of historical interest.
- Culverts.
- Sewers.
- Cable conduits.

The concealment site must be equally accessible to the person emplacing and the person recovering. However, visits by both persons to certain interior sites may be incompatible with the cover. For instance, a site in a house owned by a relative of the emplacer may be unsuitable because there is no adequate excuse for the recovery person to enter the house if he has no connection with the owner.

The site must remain accessible as long as the cache is needed. If access to a building depends upon a personal relationship with the owner, the death of the owner or the sale of the property might render it inaccessible.

Persons involved in the operation should not be compromised if the cache is discovered on the site. Even if a cache is completely sterile, as every cache should be, the mere fact that it has been placed in a particular site may compromise certain persons. If the cache were discovered by the police, they might suspect the emplacer because it was found in his relative's house.

The site must not be located where potentially hostile persons frequently visit. For instance, a site in a museum is not secure if police guards or curious visitors frequently enter the museum.

To preserve the cache material, the emplacer must ensure the site is physically secure for the preservation of the cached material. For example, most buildings involve a risk that the cache may be destroyed or damaged by fire, especially in wartime. The emplacer should consider all risks and weigh them against the advantages of an interior site.
A custodian may serve to ease access to a building or to guard a cache. However, the use of such a person is inadvisable, as a custodian poses an additional security risk. He may use the contents of the cache for personal profit or reveal its location.

The Burial Site

In selecting a burial site, consider the following factors along with the basic considerations of suitability and accessibility:

Drainage

This includes the elevation of the site and the type of soil. The importance of good drainage makes a site on high ground preferable unless other factors rule it out. Moisture is one of the greatest natural threats to the contents of a cache. Swamp muck is the most difficult soil to work in. If the site is near a stream or river, ensure that the cache is well above the all-year-high-water mark so that it will not be uncovered if the soil is washed away.

Ground Cover

The types of vegetation at the site will influence the choice. Roots of deciduous tress make digging very difficult. Coniferous trees have less extensive root systems. Also, the presence of coniferous trees usually means that the site is well drained. Does the vegetation show paths or other indications that the site is frequented too much for secure caching? Can the ground cover be easily restored to its normal appearance when burial is completed? Tall grass reveals that it has been trampled, while an overlay of leaves and humus can be replaced easily and will effectively conceal a freshly refilled hole.

Natural Concealment

The vegetation or the surrounding terrain should offer natural concealment for the burial and recovery parties working at the site. Planners should carefully consider seasonal variations in the foliage.

Types of Soil

Sandy loam is ideal because it is easy to dig and drains well. Clay soil should be avoided because it becomes quite sticky in wet weather and in dry weather it may become so hard that it is almost impossible to dig.

Snowfall and Freezing
If the cache must be buried or recovered in winter, data on the normal snowfall, the depth to which the ground freezes in winter, and the usual dates of freezing and thawing will

influence the choice of the site. Frozen ground impedes digging and requires additional time for burial and recovery. Snow on the ground is especially hazardous for the burial operation. It is practically impossible to restore the snow over the burial site to its normal appearance unless there is more snowfall or a brisk wind. Also, it is very difficult to ensure that no traces of the operation are left after the snow has melted.

Rocks and Other Subsurface Obstructions

Large obstructions that might prevent use of a particular site can be located to some extent before digging by probing with a rod or stake at the exact spot selected for the cache.

The Submersion Site

To be suitable for a submerged cache, a body of water must have certain characteristics. The presence of these characteristics can be determined only by a thorough survey of the site. Their importance will be understood after familiarization with the technicalities of submersion as discussed in Section 3, Emplacement. Submersion usually requires a boat, first for reconnoitring, then for emplacement. Thus, the accessibility problems involved in submersion usually narrow down to the availability of a boat and the action cover for using it. If there is no fishing or pleasure boating at the site the cover for this peculiar type boating may be a real problem.

In tropical areas the course of streams or rivers is frequently changed by seasonal rainfall and can cause many problems. Keep this fact in mind when choosing the site and when selecting reference points.

Recovery

Since the method for recovering a cache is generally similar to that for emplacing (Section 3) a cache, it need not be described in full. However, several important considerations should be stressed in training for a recovery operation.

Practical Exercises

Anyone who is expected to serve as a recovery person should have the experience of actually recovering dummy caches, if field exercises can be arranged securely. It is especially desirable for the recovery person to be able to master the pinpointing techniques. Mastery is best attained by practice in selecting points of emplacement and in drafting, as well as in following instructions.

Equipment

Although the equipment used in recovery is generally the same as that used in emplacement, it is important to include any additional items that may be required in recovery in the cache report. A probe rod may not be essential for emplacement, but it is necessary to have some object roughly the same size as the cache container to fill the cavity left in the ground by removal of a buried cache. Some sort of container of wrapping material may be needed to

conceal the recovered cache while it is being carried from the cache site to a safe house. Recovery of a submerged cache may require grappling lines and hooks, especially if it is heavy.

Sketch of the site

If possible, the observer should provide the recovery person with sketches of the cache site and the route to the cache site. If the recovery person must rely exclusively on verbal instructions, as in the case when communications are limited to radio telephone (RT) messages, he should draw a sketch of the site before starting on the recovery operation. He should use all the data in the verbal instructions to make the sketch as realistic as possible. Drawing a sketch will help to clarify any misunderstanding of the instructions. Also, a sketch can be followed more easily than verbal instructions. It may also be helpful for the recovery person to draw a sketch of the route from the immediate reference point to the site. But he should not carry this sketch on him because if he were apprehended the sketch might direct the enemy to the cache.

Preliminary Reconnaissance

Checking the instructions for locating the cache may be advisable, especially when the recovery operation must be performed under stringent enemy controls or when there is no extra time for searching. Careful analysis of the best available map can minimize reconnoitring activity in the vicinity of the cache and thus reduce the danger of arousing suspicion. If recovery must be done at night, the recovery person should find the cache by daylight and place an unnoticeable marker directly over it.

Probe Rod

The recovery person can avoid digging at the wrong spot by using a probe rod before starting to dig. He should push and turn the probe rod into the ground by hand, so that it will not puncture the cache's container. Never pound the probe rod with a hammer.

Procedure for Digging and Refilling the Hole

The recovery procedure is the same as for the burial, except for two points. First, never use a pick for digging the hole because it might puncture the container and damage the cached items. Second, it may be necessary to fill the hole with other objects in addition to soil after the cache is removed. Sometimes it is possible to fill the hole with rocks, sticks, or other readily available objects at the site. If no such objects are found during the preliminary reconnaissance, the recovery person should carry to the site an object roughly the same size as the cache container.

Sterilization of the Site

As with emplacement, the recovery operation must be preformed in such a way that no traces of the operation are left. Although sterilization is not as important for recovery as for

emplacement, it should be done as thoroughly as time permits. Evidence that a cache has been recovered might alert the enemy to clandestine activity in the area and provoke countermeasures.

Section 2. Packaging

Packaging usually involves packing the items to be cached, as well as the additional processing in protecting these items from adverse storage conditions. Proper packaging is important because inadequate packaging very likely will render the items unusable. Since special equipment and skilled technicians are needed for best results, packaging should be done at headquarters or a field packaging centre whenever possible. However, to familiarize operational personnel with the fundamentals of packaging, so that they can improvise field expedients for emergency use, thus section discusses determining factors, steps in packaging, wrapping materials, and criteria for the container.

Determining factors.

The first rule of packaging is that all processing is tailored to fit the specific requirements of each cache.
The method of packaging, as well as the size, shape, and weight of the package is determined by the items to be cached, by the method of caching, and, especially, by the way the cache is recovered and used. For instance, if circumstances require one man to recover the cache by himself, the container should be no larger than a small suitcase, and the total weight of container and contents no more than 30 pounds. Of course, these limits must be exceeded with some equipment, but the need for larger packages should be weighed against the difficulties and risks in handling them. Even if more than one person is available for recovery, the material should be divided whenever possible into separate packages of a size and weight readily portable by one man.

Another very important factor in packaging concerns adverse storage conditions. Any or all of the following conditions may be present: moisture, external pressure, freezing temperatures, and the bacteria and corrosive chemicals found in some soil and water. Animal life may present a hazard; insects and rodents may attack the package. If the cache is concealed in a exterior site, larger animals also may threaten it. Whether the packaging is adequate usually depends upon how carefully the conditions at the site were analysed in designing the cache. Thus, the method of caching (burial, concealment, or submersion) should be determined before the packaging is done.

It is equally important to consider how long the cache is to be used. Since one seldom knows when a cache will be needed, a sound rule is to design the packaging to withstand adverse storage conditions for at least as long as the normal shelf life of the contents to be cached.

STEPS IN PACKAGING

The exact procedure for packaging depends upon the specific requirements for the cache and upon the packaging equipment available. There are Nine Steps that are almost always necessary in packaging.

Inspecting

The items to be cached must be inspected immediately before packaging to ensure they are complete, in serviceable condition, and free of all corrosive or contaminative substances.

Cleaning

All corrodible items must be cleaned thoroughly immediately before the final preservative coating is applied. All foreign matter, including any preservative applied before the item was shipped to the field, should be removed completely. Throughout the packaging operation, all contents of the cache should be handled with rubber or freshly cleaned cotton cloves. Special handling is important because even minute particles of human sweat will corrode metallic equipment. Also, any fingerprints on the contents of the cache may enable the enemy to identify those who did the packaging.

Drying

When cleaning is completed, every trace of moisture must be removed from all corrodible items. Methods of drying include: wiping with a highly absorbent cloth, heating or applying desiccant. Usually heating is best, unless the item can be damaged by heat. To dry by heating, the item to be cached should be placed in an oven for at least 3 hours at a temperature of about 110'F. An oven can be improvised from a large metal can or drum. In humid climates, it is especially important to dry the oven thoroughly before using it by preheating it to at least 212'F. Then, insert the equipment to be cached as soon as the over cools down to about 110'F. If a desiccant is used, it should not touch any metallic surface. Silica gel is a satisfactory desiccant, and it is commonly available.

Coating with a Preservative

Apply a light coat of oil to weapons, tools, and other items with unpainted metallic surfaces. A coat of paint may suffice for other metal items.

Wrapping

When drying and coating are completed, wrap the items to be cached in a suitable material (see paragraph below on Wrapping Materials.) The wrapping should be as nearly waterproof as possible. Each item should be wrapped separately, so that one perforation in the wrapping will not expose all items in the cache. The wrapping should fit tightly to each item to eliminate air pockets, and all folds should be sealed with a waterproof substance.

Packing

Several simple rules must be observed when packing items in the container. All moisture must be removed from the interior of the container by heating or applying desiccant. A long-lasting desiccant should be packed inside the container to absorb any residual moisture. If silica gel is used, the required amount can be calculated by using the ratio of 15 kilograms of silica gel to 1 cubic meter of storage space within the container. (This figure is based on two assumptions: the container is completely moisture proof and the contents are slightly moist when inserted.) Therefore, the ratio allows an ample margin for incomplete drying and can be reduced if the drying process is known to be highly effective.
Air pockets should be eliminated as much as possible by tight packing. Thoroughly dried padding should be used liberally to fill air pockets and to protect the contents from shock. Clothing and other items, which will be useful to the recovery party, should be used for padding if possible. Items made of different metals should never touch, since continued contact may cause corrosion through electrolytic action.

Enclosing Instructions for Use of Cached Equipment

Written instructions and diagrams should be included if they facilitate assembly or use of the cached items. Instructions must be written in a language that recovery personnel can understand. The wording should be as simple as possible and unmistakably clear. Diagrams should be self-explanatory since the eventual user may not be able to comprehend written instructions because of language barriers.

Sealing & Testing Seals by Submersion

When packing is completed, the lid of the container must be sealed to make it watertight. Testing can be done by entirely submerging the container in water and watching for escaping air bubbles. Hot water should be used if possible because hot water will bring out leaks that would not be revealed by a cold water test.

WRAPPING MATERIALS

The most important requirement for wrapping material is that it be moisture proof. Also, it should be self-sealing or adhesive to a sealing material; it should be pliable enough to fit closely, with tight folds; and it should be tough enough to resist tearing and puncturing. Pliability and toughness may be combined by using two wrappings: an inner one that is thin and pliable and an outer one of heavier material. A tough outer wrapping is essential unless the container and the padding are adequate to prevent items from scraping together inside the cache. Five wrapping materials are recommended for field expedients because they often can be obtained locally and used effectively be unskilled personnel.

Aluminium Foil

For use as an inner wrapping, aluminium foil is the best of the widely available materials. It is moisture proof as long as it does not become perforated and provided the folds are

adequately sealed. The drawbacks to its use for caching are that the thin foils perforate easily, while the heavy ones (over 2 mils thick) tend to admit moisture through the folds. The heavy-duty grade of aluminium foil generally sold for kitchen use is adequate when used with an outer wrapping. Scrim-backed foil, which is heat-sealeable, is widely used commercially to package articles for shipment or storage. Portable heat-sealers that are easy to use are available commercially. Or, sealing can be done with a standard household iron.

Moisture-Resistant Papers

Several brands of commercial wrapping papers are resistant to water and grease. They do not provide lasting protection against moisture when used alone, but they are effective as an inner wrapping to prevent rubber, wax and similar substances from sticking to the items in the cache.

Rubber Repair Gum

This is a self-sealing compound generally used for repairing tires; it makes an excellent outer wrapping. Standard commercial brands come in several thicknesses; 2 mils is the most satisfactory for caching. A watertight seal is produced easily by placing two rubber surfaces together and applying pressure manually. The seal should be at least 1/2 inch wide. Since rubber repair gum has a tendency to adhere to items, an inner wrapping of non-adhesive material must be used with it, and the backing should be left on the rubber material to keep it from sticking to other items in the cache.

Grade C Barrier Material

This is a cloth impregnated with microcrystalline wax that is used extensively when packing for storage of for overseas shipment. Thus, it is generally available, and it has the additional advantage of being self-sealing. Although it is not as effective as rubber repair gum, it may be used as an outer wrapping over aluminium foil to prevent perforation of the foil. Used without an inner wrapping, three layers of grade C barrier material may keep the contents dry for as long as three months, but it is highly vulnerable to insects and rodents. Also, the wax wrapping has a low melting point and will adhere to many items, so it should not be used without an inner wrapping except in emergencies.

Wax Coating

If no wrapping material is available, an outer coating of microcrystalline wax, paraffin or a similar waxy substance can be used to protect the contents against moisture. It will not provide protection against insects and rodents. The package should be hot-dipped in the waxy substance, or the wax can be heated to molten form and applied with a brush.

THE CONTAINER

The outer container serves to protect the contents from shock, moisture and other natural hazards to which the cache may be exposed to.

Criteria for the Container

The ideal container should be:

- Completely watertight and airtight after sealing.
- Noiseless when handled and its handles should not rattle against the body of the container
- Resistant to shock and abrasion.
- Able to withstand crushing pressure.
- Lightweight in construction.
- Able to withstand rodents, insects, and bacteria.
- Equipped with a sealing device that can be closed and reopened easily and repeatedly.
- Capable of withstanding highly acidic or alkaline soil or water.

The Standard Stainless Steel Container

The standard stainless steel container comes in several sizes. Since the stainless steel container is more satisfactory than any that could be improvised in the field, it should be used whenever possible. Ideally, it should be packed at headquarters or at a field packaging centre. If the items to be cached must be obtained locally, it is still advisable to use the stainless steel container because its high resistance to moisture eliminates the need for an outer wrapping. Packers should, however, use a single wrapping even with the stainless steel container to protect the contents from any residual moisture that may be present in the container when it is sealed.

The Field Expedient Container

Obviously the ideal container cannot be improvised in the field, but the standard military and commercial containers discussed below can meet caching requirements if they are adapted with care and resourcefulness. First, a container must be sufficiently sturdy to remain unpunctured and retain its shape through whatever rough handling or crushing pressure it may encounter. (Even a slight warping may cause a joint around the lid to leak.) Second, if the lid is not already watertight and airtight, packers can make it so by improvising a sealing device. The most common type of sealing device includes a rubber-composition gasket or lining and a sharp metal rim that is pressed against common sealing device is a threaded lid. Its effectiveness can be increased by applying heavy grease to the threads. (Metallic solder should not be used for sealing because it corrodes metal surfaces when exposed to moisture.) Whenever any non-stainless metal container is used, it is important to apply several coats of high-quality paint to all exterior surfaces.

Instrument Containers. Ordinarily, aircraft and other precision instruments are shipped in steel containers with a waterproof sealing device. The standard instrument containers range

from 1/2 gallon to 10 gallon sizes. If one of suitable size can be found, only minimum modifications may be needed, In the most common type of instrument container, the only weak point is the nut and bolt that tightens the locking band around the lid. These should be replaced with a stainless steel nut and bolt.

Ammunition Boxes. Several types and sizes of steel ammunition boxes that have a rubber-gasket closing device are satisfactory for buries caches. An advantage of using ammunition boxes as a cache container is that they are usually available at a military depot.

Steel Drums. A caching container of suitable size may be found among the commercially used steel drums for shipping oil, grease, nails, soap, and other products. The most common types, however, lack an adequate sealing device, so a waterproof material should be used around the lid. Fully removable head drums with lock-ring closures generally give a satisfactory seal.

Glass Jars. The advantage of using glass is that it is waterproof and does not allow chemicals, bacteria and insects to pass through it. Although glass is highly vulnerable to shock, glass jars of a sturdy quality can withstand the crushing pressure normally encountered in caching. However, none of the available glass container have an adequate sealing device for the joint around the lid. The standard commercial canning jar with a spring clamp and a rubber washer is watertight, but the metal clamp is vulnerable to corrosion. Therefore, a glass jar with a spring clamp and a rubber washer is an adequate expedient for short-term caching of small items, but it should not be relied upon to resist moisture for more than a year.

Paint Cans. Standard cans with reusable lids require a waterproof adhesive around the lids. It is especially important to apply several coats of paint to the exterior of standard commercial cans because the metal in these cans is not as heavy as that in metal drums. Even when the exterior is thoroughly painted, paint cans probably will not resist moisture for more than a few months.

Section 3. Methods of Emplacement

Since burial is the most frequently used method of emplacement, this section describes first the complete procedure for burial, followed by a discussion of emplacement procedures peculiar to submersion and concealment. The last area discussed is the preparation of the cache report-a vital part of a caching operation.

BURIAL

When planners have designed a cache and selected the items for caching, they must carefully work out every step of the burial operation in advance.

Horizontal and Vertical Caches

Ordinarily, the hole for a buried cache is vertical (the hole is dug straight down from the surface). Sometimes a horizontal cache, with the hole dug into the side of a steep hill or bank, provides a workable solution when a suitable site on level or slightly sloping ground in not available. A horizontal cache may provide better drainage in areas of heavy rainfall, but is more likely to be exposed by soil erosion and more difficult to refill and restore to normal appearance.

Dimensions of the Hole

The exact dimensions of the hole, either vertical or horizontal, depend on the size and shape of the cache container. As a general rule, ensures that the hole is large enough for the container to be inserted easily. The horizontal dimensions of the hole should be about 30 centimetres longer and wider than the container. Most importantly, it should be deep enough to permit covering the container with soil to about 45 centimetres. This figure is recommended for normal usage because a more shallow burial risks exposure of the cache through soil erosion or inadvertent uncovering by normal indigenous activity. A deeper hole makes probing for recovery more difficult and unnecessarily prolongs the time required for burial and recovery.

Excavation Shoring

If there is a risk that the surrounding soil will cave in during excavation, boards or bags filled with subsoil may be used to shore the sides of the hole. Permanent shoring may be needed to protect an improvised container from pressure or shock.

Equipment

The following items of equipment may be helpful or indispensable in burying a cache, depending upon the conditions at the site:

- Measuring instruments (a wire or metal tape and compass) for pinpointing the site.
- Paper and pencil for recording the measurements.
- A probe rod for locating rocks, large roots, or other obstacles in the subsoil.
- Two ground sheets on which to place sod and loose soil. An article of clothing may be used for small excavation if nothing else is available.
- Sacks (sandbags, flour sacks) for holding subsoil.
- A spade or pickaxe, if the ground is too hard for spading.
- A hatchet for cutting roots.
- A crowbar for prying rocks.
- A flashlight or lamp if burial is to be done at night.

The Burial Party

Aside from locating, digging, and refilling the hole, the most important factors in this part of the emplacement operation may be expressed with one word: Personnel. Since it is almost

impossible to prevent every member of the burial party from knowing the location of the cache, each member is a prime security problem as long as the cache remains intact. Thus, planners must keep the burial party as small as possible and select each member with utmost care. Once selected, each member

Must have adequate cover to explain his absence from home or work during the operation, his trip to and from the site, and his possession of whatever equipment cannot be concealed on the way. Transportation for the burial party may be a problem, depending on the number of persons, how far they must go, and what equipment they must take. When planners have worked out all details of the operation, they must brief every member of the burial party on exactly what he is to do from start to finish.

The Operational Schedule

The final step in planning the emplacement operation is to make a schedule to set the date, time, and place for every step of the operation that requires advance coordination. The schedule will depend mainly on the circumstances, but to be practical it must include a realistic estimate of how long it will take to complete the burial. Here generalizations are worthless, and the only sure guide is actual experience under similar conditions. Planners should consider three things with respect to scheduling. A careful burial job probably will take longer than most novices will expect. Therefore, if circumstances require a tight schedule, a dry run or test exercise before taking the package to the site may be advisable.

Unless the site is exceptionally well concealed or isolated, night burial will be required to avoid detection. Because of the difficulties of working in the dark, a night time practice exercise is especially advisable. The schedule should permit waiting for advantageous weather conditions. The difficulties of snow have already been mentioned. Rainy weather increases the problems of digging and complicates the cover story. If the burial is to be done at night, a moonless or a heavy overcast night is desirable.

Site Approach

Regardless of how effective the cover of actions during the trip to the cache site, the immediate approach must be completely unobserved to avoid detection of the burial. To reduce the risk of the party being observed, planners must carefully select the point where the burial party disappears, perhaps by turning off a road into woods. They should as carefully select the reappearance point. In addition, the return trip should be by a different route. The burial party should strictly observe the rule for concealed movement. The party should proceed cautiously and silently along a route that makes the best use of natural concealment. Concealed movement requires foresight, with special attention to using natural concealment while reconnoitring the route and to preventing rattles when preparing the package and contents.

Security Measures at the Site

The burial party must maintain maximum vigilance at the caches site, since detection can be disastrous. The time spent at the site is the most critical. At least one lookout should be on guard constantly. If one man must do the burial by himself, he should pause frequently to look and listen. The burial party should use flashlight or lanterns as little as possible, and should take special care to mask the glare. Planning should include emergency actions in case the burial party is interrupted. The party should be so thoroughly briefed that it will respond instantly to any sign of danger. Planner should also consider the various escape routes and whether the party will attempt to retain the package or conceal it along the escape route.

Steps in Digging and Refilling

Although procedures will vary slightly with the design of the cache, persons involved in caching operations must never overlook certain basic steps. The whole procedure is designed to restore the site to normal as far as possible.

Site Sterilization

When the hole is refilled, make a special effort to ensure that the site is left sterile-restored to normal in every way, with no clues left to indicate burial or the burial party's visit to the vicinity. Since sterilization is most important for the security of the operation, the schedule should allow ample time to complete these final steps in an unhurried, thorough manner.

Dispose of any excess soil far enough away from the site to avoid attracting attention to the site. Flushing the excess soil into a stream is the ideal solution. Check all tools and equipment against a checklist to ensure that nothing is left behind. This should include all personnel items that may drop from pockets. To keep this risk to a minimum, members of the burial party should carry nothing on their persons except the essentials for doing the job and covering their actions.

Make a final inspection of the site for any traces of the burial. Because this step is more difficult on a dark night, use of a carefully prepared checklist is essential. With a night burial, returning to the site in the daytime to inspect it for telltale evidence may be advisable, if this can be done safely.

SUBMERSION

Emplacing a submerged cache always involves two basic steps: weighting the container to keep it from floating to the surface and mooring it keep it in place.

Container Weighting and Mooring

Ordinarily, container weights rest on the bottom of the lake or river and function as anchors, and the mooring connect the anchors to the container. The moorings must also serve a second function, which is to provide a handle for pulling the cache to the surface when it is recovered. If the moorings are not accessible for recovery, another line must extend from the cache to a fixed, accessible object in the water or on shore. There are four types of moorings.

(1) Spider Web Mooring. The container is attached to several mooring cables that radiate to anchors placed around it to form a web. The container must be buoyant so that it lifts the cables for enough off the bottom to be readily secured by grappling. The site must be located exactly at the time of emplacement by visual sightings to fixed landmarks in the water, or along the shore, using several FRP's to establish a point where two sighted lines intersect. For recovery, the site is located by taking sightings on the reference points, when a mooring cable is engaged by dragging the bottom of diving. This method of mooring is most difficult for recovery. It can be used only where the bottom is smooth and firm enough for dragging, or where the water is not too deep, cold, or murky for diving.

(2) Line-to-Shore Mooring. A line in run from the weighted container to an immovable object along the shore. The section of the line that extends from the shore to the shore must be buried in the ground or otherwise well concealed.

(3) Buoy Mooring. A line is run from the weighted container to a buoy or other fixed, floating marker, and fastened well below the waterline. This method is secure only as long as the buoy is left in place. Buoys are generally inspected and repainted every six months or so. The inspection schedule should be determined before a buoy is used.

(4) Structural Mooring. A line for retrieving the weighted container is run to a bridge pier or other solid structure in the water. This line must be fastened well below the low-water mark.

Essential Data for Submersion

Whatever method of mooring is used, planners must carefully consider certain data before designing a submerged cache. The cache very likely will be lost if any of the following critical factors are overlooked:

Buoyancy. Many containers are buoyant even when filled, so the container must be weighted sufficiently to submerge it and keep it in place. If the contents do not provide enough weight, emplacers must make up the balance by attaching a weight to the container. The approximate weight needed to attain zero buoyancy is shown in Appendix. This figure applies to several sizes of stainless steel containers.

The weighting required for any container can be calculated theoretically if the displacement of the container and the gross weight of the container plus its contents are known. This calculation may be useful for designing an anchor, but is should not be relied upon for actual emplacement. To avoid hurried improvisation during emplacement, emplacers should always test the buoyancy in advance by actually submerging the weighted container. This test determines only that a submerged cache will not float to the surface. Additional weighting may be required to keep it from drifting along the bottom. As a general rule, the additional weight should be a least one-tenth of the gross weight required to make the container sink; more weight is advisable if strong currents are present.

Submersion depth. Planners must first determine the depth which the container is to be submerged to calculate the water pressure that the container must withstand. The greater the depth, the greater the danger that the container will be crushed by water pressure. For instance, the standard stainless steel burial container will buckle at a depth of approximately 4.3 meters. The difficulty of waterproofing also increases with depth. Thus, the container should not be submerged any deeper than necessary to avoid detection. As a general rule, 2.2 meters is the maximum advisable depth for caching. If seasonal or tidal variations in the water level require deeper submersion, the container should be tested by actual submersion to the maximum depth it must withstand.

Depth of the Water. Emplacers must measure accurately the depth of the water where at the point where the cache is to be placed. The will be the submersion depth if the cache is designed so that the container rests on the bottom of the lake or river. The container may be suspended some distance above the bottom, but the depth of the water must be known to determine the length of moorings connecting the containers to the anchors.

High-and-Low-Water Marks. Any tidal or seasonal changes in the depth of the water should be estimated as accurately as possible. Emplacers must consider the low-water mark to ensure that low water will not leave cache exposed. The high-water point also should be considered to ensure that the increased depth will crush the container or prevent recovery.

Type of Bottom. Emplacers should probe as thoroughly as possible the bed of the lake or river in the vicinity of the cache. If the bottom is soft and silky, the cache may sink into the muck, become covered with sediment, or drift out of place. If the bottom is rocky or covered with debris, the mooring may become snagged. Any of these conditions may make recovery very difficult.

Water Motion. Emplacers should consider tides, currents, and waves because any water motion will put additional strain on the moorings of the cache. Moorings must be strong enough to withstand the greatest possible strain. If the water motion tends to rock the cache, emplacers must take special care to prevent the moorings from rubbing and fraying.

Clearness of the Water. When deciding how deep to submerge the cache, emplacers must first determine how far the cache can be seen through the water. If the water is clear, the cache may need to be camouflaged by painting the container to match the bottom. (Always

paint shiny metallic fixtures a dull colour.) Very murk water makes recovery by divers more difficult.

Water Temperature. Planners must consider seasonal changes in the temperature of the water. Recovery may be impossible in the winter if the water freezes. The dates when the lake or river usually freezes and thaws should be determined as accurately as possible.

Salt Water. Since seawater is much more corrosive than fresh water, tidal estuaries and lagoons should not be used for caching. The only exception is the maritime re-supply operation, where equipment may be submerged temporarily along the seacoast until it can be recovered by a shore party.

CONCEALMENT

There are many different ways to conceal a cache in natural or ready-made hiding places. For instance, if a caching party were hiding weapons and ammunition in a cave, relying entirely on natural concealment, the emplacement operation would be reduced to simply locating the site. No tools would be needed except paper, pencil and a flashlight. On the other hand, if the party were sealing a packet of jewels in a brick wall, a skilled mason would be needed, his kit of tools, and a supply of mortar expertly mixed to match the original brick wall.

When planning for concealment, planners must know the local residents and their customs. During the actual emplacement, the caching party must ensure the operation is not observed. The final sterilization of the site is especially important, since a concealment site is usually open to frequent observation.

CACHING COMMUNICATIONS EQUIPMENT

As a general rule, all equipment for a particular purpose (demolitions, survival) should be included in one container. Some equipment, however, is so sensitive from a security standpoint that it should be packed in several containers and cached in different locations to minimize the danger of discovery by the enemy. This is particularly true of communications equipment, since under some circumstances anyone who acquires a whole RT set with a signal plan and cryptographic material would be able to play the set back. An especially dangerous type of penetration would result. In the face of this danger, the signal plan and the cryptographic material must never be placed in the same container. Ideally a communications kit should be distributed among three containers and cached in different locations. If three containers are used, the distribution may be as follows:

Container #1: The RT set, including the crystals.
Container #2: The signal plan and operational supplies for the RT operator, such as Currency, barter and small arms.
Container #3: The cryptographic material.

When several containers are used for one set of equipment, they must be placed far enough apart so that if one is discovered, the others will not be detected in the immediate vicinity. On the other hand, they should be located close enough together so that they can be recovered conveniently in one operation. The distance between containers will depend on the particular situation, but ordinarily they should be at least 10 meters apart. One final reference point ordinarily is used for a multiple cache. The caching party should be careful to avoid placing multiple caches in a repeated pattern. Discovery of one multiple cache would give the opposition a guide for probing others placed in a similar pattern.

CACHING MEDICAL EQUIPMENT

A feasibility study must be performed to determine the need for the caching of medical supplies. The purpose of caches is to store excess medical supplies, to maintain mobility, and deny access to the enemy. Also caching large stockpiles of medical supplies allows pre-positioning vital supplies in anticipation of future planned operations.

THE CACHE REPORT

The final step, which is vital in every emplacement operation, is the preparation of a cache report. This report records the essential data for recovery. The cache report must provide all of the information that someone unfamiliar with the locality needs to find his way to the site, recover the cache, and return safely. The report format follows.

THE TWELVE-POINT CACHE REPORT

1. Type of Cache
2. Method of Caching
3. Contents
4. Description of Containers
5. General Area
6. Immediate Area
7. Cache Location
8. Emplacement Details
9. Operational Data and Remarks
10. Dates of Emplacement and Duration of the Cache
11. Sketches and Diagrams
12. Radio Message for Recovery

Content

The most important parts of the cache report must include instructions for finding and recovering the cache. it should also include any other information that will ease planning the recover operation. Since the details will depend upon the situation and the particular needs of each organization, the exact format of the report cannot be prescribed. The Twelve-Point cache Report is intended merely to point out the minimum essential data. Whatever format is used, the importance of attention to detail cannot be overemphasized. A

careless error or omission in the cache report may prevent recovery of the cache when it is needed.

Procedure

The observer should collect as much data as possible during the personal reconnaissance to assist in selecting a site and planning emplacement and recovery operations. Drafting the cache report before emplacement is also advisable. Following these procedures will reveal the omissions. Then the missing data can be obtained at the site. If this procedure is followed, the preparation of the final cache report will be reduced to an after-action check. This check ensures that the cache actually was placed precisely where planned and that all other descriptive details are accurate. Although this ideal may seldom be realized, two procedures always should be followed:

- The caching party should complete the final cache report as soon as possible after emplacement, as details are fresh in mind.
- Someone who has not visited the site should check the instructions by using them to lead the party to the site. When so such person is available, someone should visit the site shortly after emplacement, provided he can do so securely. If the cache has been embraced at night, a visit to the site in daylight may also provide an opportunity to check on the sterilization of the site.

APPENDIX

Weights Needed to Submerge Containers

Container Dimensions (inches)	Empty Container weight (pounds)	Appox. weight that must be added to empty container weight to attain zero buoyancy (pounds)
7x9x8 1/2	5	15
7x9x16 1/2	8	31
7x9x40	16	77
7x9x45	17 1/2	88
7x9750	19	97